

Work Order ID 135166

July 31, 2015 3:25:59 PM

**WR**

A.P.  
15-05-10 \*135166\*

Page 1

Item ID: D350-748-243TRN

Accept

\*N9000040100\*

Setup Start \*NS1\*

Revision ID:

Stop \*NS2\*

Item Name: Crosstube Installation, High Aft

Start Date: 7/31/2015 Start Qty: 1.00

\*1\*

Cust Item ID:

Required Date: 8/14/2015 Req'd Qty: 1.00

\*1\*

Customer:

Reference:

Approvals: Process Plan: SH

Date: 1 5 0 7 3 1 Tooling:

Date:

Run Start \*NR1\*

QC:

Date:

SPC (Y/N):

Date:

Stop \*NR2\*

| Sequence ID/<br>Work Center ID | Operation<br>Description | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|

Draw Nbr

Revision Nbr

D350-748-243

A

100

0.00

\*100\*

MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.03

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs on both ends as per Folio

2-Turn first side as per Folio

3- File transition lines smooth.

FOLIO REV: AD

DWG REV: A

1 φ  
mmc  
15/08/13

110

QC1- Inspection performed by CMM

0.00

\*110\*

QC

Memo

0.00

Quality Control

1 φ  
mmc  
15/08/17

DQA:

Date: 15/09/28



## WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: ☒

Date: 15/09/22

Work Order update only ☐

| Work Order: <u>135166</u><br>Part No. <u>D350-748-243TRN</u><br>NCR No. <u>15-5361</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>DISPOSITION</b><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input checked="" type="checkbox"/><br>Suspected Unapproved <input type="checkbox"/> | <b>AGAINST DEPARTMENT/PROCESS</b><br><table style="width:100%;"> <tr> <td>Skid-tube <input type="checkbox"/></td> <td>Cross tube <input checked="" type="checkbox"/></td> <td>Water Jet <input type="checkbox"/></td> <td>Engineering <input type="checkbox"/></td> </tr> <tr> <td>Machining <input type="checkbox"/></td> <td>Small Fab <input type="checkbox"/></td> <td>Prod. Eng. Coord. <input type="checkbox"/></td> <td>Quality <input type="checkbox"/></td> </tr> <tr> <td>Thermoforming <input type="checkbox"/></td> <td>Finishing <input type="checkbox"/></td> <td>Rec/Store/Packaging <input type="checkbox"/></td> <td>Other <input type="checkbox"/></td> </tr> <tr> <td>Large Fab <input type="checkbox"/></td> <td>Composite <input type="checkbox"/></td> <td>Supplier <input type="checkbox"/></td> <td></td> </tr> </table> |                                                            |                                                                                                                                                                              | Skid-tube <input type="checkbox"/>                       | Cross tube <input checked="" type="checkbox"/> | Water Jet <input type="checkbox"/> | Engineering <input type="checkbox"/> | Machining <input type="checkbox"/> | Small Fab <input type="checkbox"/> | Prod. Eng. Coord. <input type="checkbox"/> | Quality <input type="checkbox"/>            | Thermoforming <input type="checkbox"/>   | Finishing <input type="checkbox"/>        | Rec/Store/Packaging <input type="checkbox"/> | Other <input type="checkbox"/>            | Large Fab <input type="checkbox"/> | Composite <input type="checkbox"/> | Supplier <input type="checkbox"/> |                                 |                                        |                                             |                                   |                                       |                                                |                                    |                                |                                                          |                                        |                                   |                                 |                                               |                               |                                         |                                       |                                   |                                                 |                                                            |                                             |                                            |                                              |                                          |                                |                                        |                                          |                                     |                                             |                                           |                                   |                                      |                                  |                                  |                                           |                                  |                                     |                                        |                                     |                                 |                              |                                              |                                             |                                                          |                                       |                                  |                                     |                                              |                                        |                                      |                                                |                                           |                                           |                                                |         |  |  |  |                                        |                                   |
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| Skid-tube <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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| Machining <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Small Fab <input type="checkbox"/>                                                                                                                                                        | Prod. Eng. Coord. <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Quality <input type="checkbox"/>                           |                                                                                                                                                                              |                                                          |                                                |                                    |                                      |                                    |                                    |                                            |                                             |                                          |                                           |                                              |                                           |                                    |                                    |                                   |                                 |                                        |                                             |                                   |                                       |                                                |                                    |                                |                                                          |                                        |                                   |                                 |                                               |                               |                                         |                                       |                                   |                                                 |                                                            |                                             |                                            |                                              |                                          |                                |                                        |                                          |                                     |                                             |                                           |                                   |                                      |                                  |                                  |                                           |                                  |                                     |                                        |                                     |                                 |                              |                                              |                                             |                                                          |                                       |                                  |                                     |                                              |                                        |                                      |                                                |                                           |                                           |                                                |         |  |  |  |                                        |                                   |
| Thermoforming <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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| Large Fab <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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| Date: <u>15/9/3</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | MRB (QSI042) Approval<br>DAS 12 15/9/3<br>9-89             |                                                                                                                                                                              |                                                          |                                                |                                    |                                   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| Description Work Order Deviation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| Wall thickness measurement is over tolerance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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| <table style="width:100%;"> <tr> <th colspan="2" style="text-align: left;">Root Cause</th> <th colspan="4" style="text-align: left;">FAULT CATEGORY</th> </tr> <tr> <td style="width:15%;">Environment <input type="checkbox"/></td> <td style="width:15%;">No Re-verification <input type="checkbox"/></td> <td style="width:15%;">Pressure/Forced <input type="checkbox"/></td> <td style="width:15%;">Temperature/Cure <input type="checkbox"/></td> <td style="width:15%;">Power Loss/Surge <input type="checkbox"/></td> <td style="width:15%;">Positioned Wrong <input type="checkbox"/></td> </tr> <tr> <td>Design <input type="checkbox"/></td> <td>Operator <input type="checkbox"/></td> <td>Bending <input type="checkbox"/></td> <td>Set-up <input type="checkbox"/></td> <td>Folio/Program <input type="checkbox"/></td> <td>Outside Dimensions <input type="checkbox"/></td> </tr> <tr> <td>Doc/Data <input type="checkbox"/></td> <td>Offset/Setup <input type="checkbox"/></td> <td>Centre Not Concentric <input type="checkbox"/></td> <td>BOM/Route <input type="checkbox"/></td> <td>Grain <input type="checkbox"/></td> <td><input checked="" type="checkbox"/> Over/Under tolerance</td> </tr> <tr> <td>Equip/Tooling <input type="checkbox"/></td> <td>Supplier <input type="checkbox"/></td> <td>Cracks <input type="checkbox"/></td> <td>Broken/Damage/Defect <input type="checkbox"/></td> <td>Weld <input type="checkbox"/></td> <td>Part Incorrect <input type="checkbox"/></td> </tr> <tr> <td>Handling/Pre <input type="checkbox"/></td> <td>Training <input type="checkbox"/></td> <td>Crimp/Kink/Ripple/Wave <input type="checkbox"/></td> <td>Inspection Incomplete/Unqualified <input type="checkbox"/></td> <td>Wrong Stock Pulled <input type="checkbox"/></td> <td>Part Lost/Missing <input type="checkbox"/></td> </tr> <tr> <td>Material <input checked="" type="checkbox"/></td> <td>Use for Testing <input type="checkbox"/></td> <td>Cuffs <input type="checkbox"/></td> <td>Contamination <input type="checkbox"/></td> <td>Out of Sequence <input type="checkbox"/></td> <td>Part Moved <input type="checkbox"/></td> </tr> <tr> <td>Internal Transport <input type="checkbox"/></td> <td>Poor Information <input type="checkbox"/></td> <td>Crushing <input type="checkbox"/></td> <td>Countersink <input type="checkbox"/></td> <td>Off-set <input type="checkbox"/></td> <td>Drawing <input type="checkbox"/></td> </tr> <tr> <td>Tribal Knowledge <input type="checkbox"/></td> <td>Rushing <input type="checkbox"/></td> <td>Heat Treat <input type="checkbox"/></td> <td>Cut Too Short <input type="checkbox"/></td> <td>Mislabeled <input type="checkbox"/></td> <td>Finish <input type="checkbox"/></td> </tr> <tr> <td>LOA <input type="checkbox"/></td> <td>Product Improvement <input type="checkbox"/></td> <td>Wave/Twist in Tube <input type="checkbox"/></td> <td>Instructions Incomplete/Unclear <input type="checkbox"/></td> <td>Fit/Function <input type="checkbox"/></td> <td>Misread <input type="checkbox"/></td> </tr> <tr> <td>Substation <input type="checkbox"/></td> <td>Process Improvement <input type="checkbox"/></td> <td>Marks/Chatter <input type="checkbox"/></td> <td>Drill Holes <input type="checkbox"/></td> <td>Misaligned/off center <input type="checkbox"/></td> <td>Turning Sequence <input type="checkbox"/></td> </tr> <tr> <td>Past Expiry Date <input type="checkbox"/></td> <td>Manufacturing Process <input type="checkbox"/></td> <td colspan="4" rowspan="2" style="vertical-align: top;">OTHER :</td> </tr> <tr> <td>Misidentified <input type="checkbox"/></td> <td>Past Due <input type="checkbox"/></td> </tr> </table> |                                                                                                                                                                                           |                                                                                                                                                                                                                              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               |                                    |                                    | Environment <input type="checkbox"/>       | No Re-verification <input type="checkbox"/> | Pressure/Forced <input type="checkbox"/> | Temperature/Cure <input type="checkbox"/> | Power Loss/Surge <input type="checkbox"/>    | Positioned Wrong <input type="checkbox"/> | Design <input type="checkbox"/>    | Operator <input type="checkbox"/>  | Bending <input type="checkbox"/>  | Set-up <input type="checkbox"/> | Folio/Program <input type="checkbox"/> | Outside Dimensions <input type="checkbox"/> | Doc/Data <input type="checkbox"/> | Offset/Setup <input type="checkbox"/> | Centre Not Concentric <input type="checkbox"/> | BOM/Route <input type="checkbox"/> | Grain <input type="checkbox"/> | <input checked="" type="checkbox"/> Over/Under tolerance | Equip/Tooling <input type="checkbox"/> | Supplier <input type="checkbox"/> | Cracks <input type="checkbox"/> | Broken/Damage/Defect <input type="checkbox"/> | Weld <input type="checkbox"/> | Part Incorrect <input type="checkbox"/> | Handling/Pre <input type="checkbox"/> | Training <input type="checkbox"/> | Crimp/Kink/Ripple/Wave <input type="checkbox"/> | Inspection Incomplete/Unqualified <input type="checkbox"/> | Wrong Stock Pulled <input type="checkbox"/> | Part Lost/Missing <input type="checkbox"/> | Material <input checked="" type="checkbox"/> | Use for Testing <input type="checkbox"/> | Cuffs <input type="checkbox"/> | Contamination <input type="checkbox"/> | Out of Sequence <input type="checkbox"/> | Part Moved <input type="checkbox"/> | Internal Transport <input type="checkbox"/> | Poor Information <input type="checkbox"/> | Crushing <input type="checkbox"/> | Countersink <input type="checkbox"/> | Off-set <input type="checkbox"/> | Drawing <input type="checkbox"/> | Tribal Knowledge <input type="checkbox"/> | Rushing <input type="checkbox"/> | Heat Treat <input type="checkbox"/> | Cut Too Short <input type="checkbox"/> | Mislabeled <input type="checkbox"/> | Finish <input type="checkbox"/> | LOA <input type="checkbox"/> | Product Improvement <input type="checkbox"/> | Wave/Twist in Tube <input type="checkbox"/> | Instructions Incomplete/Unclear <input type="checkbox"/> | Fit/Function <input type="checkbox"/> | Misread <input type="checkbox"/> | Substation <input type="checkbox"/> | Process Improvement <input type="checkbox"/> | Marks/Chatter <input type="checkbox"/> | Drill Holes <input type="checkbox"/> | Misaligned/off center <input type="checkbox"/> | Turning Sequence <input type="checkbox"/> | Past Expiry Date <input type="checkbox"/> | Manufacturing Process <input type="checkbox"/> | OTHER : |  |  |  | Misidentified <input type="checkbox"/> | Past Due <input type="checkbox"/> |
| Root Cause                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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| Environment <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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   |                                    |                                    |                                            |                                             |                                          |                                           |                                              |                                           |                                    |                                    |                                   |                                 |                                        |                                             |                                   |                                       |                                                |                                    |                                |                                                          |                                        |                                   |                                 |                                               |          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| Design <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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   |                                    |                                    |                                            |                                             |                                          |                                           |                                              |                                           |                                    |                                    |                                   |                                 |                                        |                                             |                                   |                                       |                                                |                                    |                                |                                                          |                                        |                                   |                                 |                                               |          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| Doc/Data <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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   |                                    |                                    |                                            |                                             |                                          |                                           |                                              |                                           |                                    |                                    |                                   |                                 |                                        |                                             |                                   |                                       |                                                |                                    |                                |                                                          |                                        |                                   |                                 |                                               |          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| Equip/Tooling <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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   |                                    |                                    |                                            |                                             |                                          |                                           |                                              |                                           |                                    |                                    |                                   |                                 |                                        |                                             |                                   |                                       |                                                |                                    |                                |                                                          |                                        |                                   |                                 |                                               |          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| Handling/Pre <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Inspection Incomplete/Unqualified <input type="checkbox"/> | Wrong Stock Pulled <input type="checkbox"/>                                                                                                                                  | Part Lost/Missing <input type="checkbox"/>               |                                                |                                    |                                      |                                    |                                    |                                            |                                             |                                          |                                           |                                              |                                           |                                    |                                    |                                   |                                 |                                        |                                             |                                   |                                       |                                                |                                    |                                |                                                          |                                        |                                   |                                 |                                               |          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| Material <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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   |                                    |                                    |                                            |                                             |                                          |                                           |                                              |                                           |                                    |                                    |                                   |                                 |                                        |                                             |                                   |                                       |                                                |                                    |                                |                                                          |                                        |                                   |                                 |                                               |          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| Internal Transport <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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| Tribal Knowledge <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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   |                                    |                                    |                                            |                                             |                                          |                                           |                                              |                                           |                                    |                                    |                                   |                                 |                                        |                                             |                                   |                                       |                                                |                                    |                                |                                                          |                                        |                                   |                                 |                                               |          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| LOA <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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   |                                    |                                    |                                            |                                             |                                          |                                           |                                              |                                           |                                    |                                    |                                   |                                 |                                        |                                             |                                   |                                       |                                                |                                    |                                |                                                          |                                        |                                   |                                 |                                               |          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| Substation <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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   |                                    |                                    |                                            |                                             |                                          |                                           |                                              |                                           |                                    |                                    |                                   |                                 |                                        |                                             |                                   |                                       |                                                |                                    |                                |                                                          |                                        |                                   |                                 |                                               |          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| Past Expiry Date <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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| Misidentified <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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# Work Order ID 135166

**\*135166\***

Page 2

July 31, 2015 3:25:59 PM

Item ID: D350-748-243TRN Accept **\*N900040100\*** Setup Start **\*NS1\***  
 Revision ID: Stop **\*NS2\***  
 Item Name: Crosstube Installation, High Aft  
 Start Date: 7/31/2015 Start Qty: 1.00 **\*1\*** Cust Item ID:  
 Required Date: 8/14/2015 Req'd Qty: 1.00 **\*1\*** Customer:  
 Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_ Run Start **\*NR1\***  
 QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_ Stop **\*NR2\***

| Sequence ID/<br>Work Center ID                                  | Operation<br>Description                                                                                                                                                                                         | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp                                        |
|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|-------------------------------------------------------|
| 120<br><b>*120*</b><br>Mori Seiki<br>Mori Seiki CNC Lathe Large | MORI SEIKI CNC LATHE LARGE<br><br>Memo<br>1-Turn second side as per Folio _____<br>2- File transition lines smooth.<br>3-Scribe Part & Batch as per Dwg D350-748-143<br>FOLIO REV: <u>A</u><br>DWG REV: <u>A</u> | 0.00<br><br>0.05     |         |        |              | 1             | Ø             |                  | <i>mmL</i><br>15/08/18                                |
| 130<br><b>*130*</b><br>QC<br>Quality Control                    | QC1- Inspection performed by CMM<br><br>Memo                                                                                                                                                                     | 0.00<br><br>0.00     |         |        |              | 1             | Ø             |                  | <b>P.T.O.</b><br>First Page<br><i>mmL</i><br>15/08/19 |
| 140<br><b>*140*</b><br>QC<br>Quality Control                    | QC8- Inspect parts - second check<br><br>Memo                                                                                                                                                                    | 0.00<br><br>0.00     |         |        |              | 1             | Ø             |                  | 15-08-24<br><br>DAS<br>47<br>9-89                     |

DQA: \_\_\_\_\_ Date: \_\_\_\_\_



## WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

Work Order update only ☐

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| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  | <b>DISPOSITION</b><br><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input type="checkbox"/><br>Suspected Unapproved <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  | <b>AGAINST DEPARTMENT/PROCESS</b><br><br><div style="display: flex; justify-content: space-between;"> <div>           Skid-tube <input type="checkbox"/><br/>           Machining <input type="checkbox"/><br/>           Thermoforming <input type="checkbox"/><br/>           Large Fab <input type="checkbox"/> </div> <div>           Cross tube <input type="checkbox"/><br/>           Small Fab <input type="checkbox"/><br/>           Finishing <input type="checkbox"/><br/>           Composite <input type="checkbox"/> </div> <div>           Water Jet <input type="checkbox"/><br/>           Prod. Eng. Coord. <input type="checkbox"/><br/>           Rec/Store/Packaging <input type="checkbox"/><br/>           Supplier <input type="checkbox"/> </div> <div>           Engineering <input type="checkbox"/><br/>           Quality <input type="checkbox"/><br/>           Other <input type="checkbox"/> </div> </div> |  |  |  |                       |  |
| Date :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  | Step #:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  | QTY Effective :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |  |  | MRB (QSI042) Approval |  |
| Description Work Order Deviation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  | Disposition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |  | Completed By          |  |
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| <b>Root Cause</b><br><div style="display: flex; justify-content: space-between;"> <div>           Environment <input type="checkbox"/><br/>           Design <input type="checkbox"/><br/>           Doc/Data <input type="checkbox"/><br/>           Equip/Tooling <input type="checkbox"/><br/>           Handling/Pre <input type="checkbox"/><br/>           Material <input type="checkbox"/><br/>           Internal Transport <input type="checkbox"/><br/>           Tribal Knowledge <input type="checkbox"/><br/>           LOA <input type="checkbox"/><br/>           Substation <input type="checkbox"/><br/>           Past Expiry Date <input type="checkbox"/><br/>           Misidentified <input type="checkbox"/> </div> <div>           No Re-verification <input type="checkbox"/><br/>           Operator <input type="checkbox"/><br/>           Offset/Setup <input type="checkbox"/><br/>           Supplier <input type="checkbox"/><br/>           Training <input type="checkbox"/><br/>           Use for Testing <input type="checkbox"/><br/>           Poor Information <input type="checkbox"/><br/>           Rushing <input type="checkbox"/><br/>           Product Improvement <input type="checkbox"/><br/>           Process Improvement <input type="checkbox"/><br/>           Manufacturing Process <input type="checkbox"/><br/>           Past Due <input type="checkbox"/> </div> </div> |  | <b>FAULT CATEGORY</b><br><div style="display: flex; justify-content: space-between;"> <div>           Pressure/Forced <input type="checkbox"/><br/>           Bending <input type="checkbox"/><br/>           Centre Not Concentric <input type="checkbox"/><br/>           Cracks <input type="checkbox"/><br/>           Crimp/Kink/Ripple/Wave <input type="checkbox"/><br/>           Cuffs <input type="checkbox"/><br/>           Crushing <input type="checkbox"/><br/>           Heat Treat <input type="checkbox"/><br/>           Wave/Twist in Tube <input type="checkbox"/><br/>           Marks/Chatter <input type="checkbox"/> </div> <div>           Temperature/Cure <input type="checkbox"/><br/>           Set-up <input type="checkbox"/><br/>           BOM/Route <input type="checkbox"/><br/>           Broken/Damage/Defect <input type="checkbox"/><br/>           Inspection Incomplete/Unqualified <input type="checkbox"/><br/>           Contamination <input type="checkbox"/><br/>           Countersink <input type="checkbox"/><br/>           Cut Too Short <input type="checkbox"/><br/>           Instructions Incomplete/Unclear <input type="checkbox"/><br/>           Drill Holes <input type="checkbox"/> </div> <div>           Power Loss/Surge <input type="checkbox"/><br/>           Folio/Program <input type="checkbox"/><br/>           Grain <input type="checkbox"/><br/>           Weld <input type="checkbox"/><br/>           Wrong Stock Pulled <input type="checkbox"/><br/>           Out of Sequence <input type="checkbox"/><br/>           Off-set <input type="checkbox"/><br/>           Misabeled <input type="checkbox"/><br/>           Fit/Function <input type="checkbox"/><br/>           Misaligned/off center <input type="checkbox"/> </div> <div>           Positioned Wrong <input type="checkbox"/><br/>           Outside Dimensions <input type="checkbox"/><br/>           Over/Under tolerance <input type="checkbox"/><br/>           Part Incorrect <input type="checkbox"/><br/>           Part Lost/Missing <input type="checkbox"/><br/>           Part Moved <input type="checkbox"/><br/>           Drawing <input type="checkbox"/><br/>           Finish <input type="checkbox"/><br/>           Misread <input type="checkbox"/><br/>           Turning Sequence <input type="checkbox"/> </div> </div> |  | OTHER : <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |  |                       |  |

# Work Order ID 135166

**\*135166\***

Page 3

July 31, 2015 3:25:59 PM

Item ID: D350-748-243TRN

Accept

**\*N900040100\***

Setup Start **\*NS1\***

Revision ID:

Item Name: Crosstube Installation, High Aft

Stop **\*NS2\***

Start Date: 7/31/2015 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 8/14/2015 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start **\*NR1\***

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop **\*NR2\***

| Sequence ID/<br>Work Center ID | Operation<br>Description                                     | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|--------------------------------------------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
| 150                            |                                                              | 0.00                 |         |        |              |               |               |                  |                |
| <b>*150*</b>                   | Large Fab                                                    |                      |         |        |              |               |               |                  |                |
| Crosstubes                     | Memo                                                         | 0.02                 |         |        |              |               |               |                  |                |
| Crosstubes                     | 1-Grind machining marks                                      |                      |         |        |              |               |               |                  |                |
| 190                            |                                                              | 0.00                 |         |        |              |               |               |                  |                |
| <b>*190*</b>                   | Packaging                                                    |                      |         |        |              |               |               |                  |                |
| Packaging                      | Memo                                                         | 0.00                 |         |        |              |               |               |                  |                |
| Packaging                      | Identify and stock in kanban rack<br>Location: <u>LG 003</u> |                      |         |        |              |               |               |                  |                |
| 200                            |                                                              | 0.00                 |         |        |              |               |               |                  |                |
| <b>*200*</b>                   | QC21- Final Inspection - Work Order Release                  |                      |         |        |              |               |               |                  |                |
| QC                             | Memo                                                         | 0.02                 |         |        |              |               |               |                  |                |
| Quality Control                |                                                              |                      |         |        |              |               |               |                  |                |

BL 15/09/18

BL 15/09/18

MLK SEP 21 2015

20150921

DQA: \_\_\_\_\_ Date: \_\_\_\_\_



## WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

Work Order update only ☐

|                                                              |                                                |                                                                                                                                                                                    |                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                               |  |                       |                                                                                                                    |  |
|--------------------------------------------------------------|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|--|-----------------------|--------------------------------------------------------------------------------------------------------------------|--|
| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____ |                                                | <b>DISPOSITION</b><br><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input type="checkbox"/><br>Suspected Unapproved <input type="checkbox"/> |                                                            | <b>AGAINST DEPARTMENT/PROCESS</b><br><br><div style="display: flex; justify-content: space-between;"> <div>           Skid-tube <input type="checkbox"/><br/>           Machining <input type="checkbox"/><br/>           Thermoforming <input type="checkbox"/><br/>           Large Fab <input type="checkbox"/> </div> <div>           Cross tube <input type="checkbox"/><br/>           Small Fab <input type="checkbox"/><br/>           Finishing <input type="checkbox"/><br/>           Composite <input type="checkbox"/> </div> <div>           Water Jet <input type="checkbox"/><br/>           Prod. Eng. Coord. <input type="checkbox"/><br/>           Rec/Store/Packaging <input type="checkbox"/><br/>           Supplier <input type="checkbox"/> </div> <div>           Engineering <input type="checkbox"/><br/>           Quality <input type="checkbox"/><br/>           Other <input type="checkbox"/> </div> </div> |                                               |  |                       |                                                                                                                    |  |
| Date :                                                       |                                                | Step #:                                                                                                                                                                            |                                                            | QTY Effective :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                               |  | MRB (QSI042) Approval |                                                                                                                    |  |
| Description Work Order Deviation                             |                                                |                                                                                                                                                                                    |                                                            | Disposition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                               |  |                       | Completed By<br><br><br>Lead hand / Supervisor<br>Approval Verification<br><br><br>QC / QA Coordinator<br>Approval |  |
|                                                              |                                                |                                                                                                                                                                                    |                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                               |  |                       |                                                                                                                    |  |
|                                                              |                                                |                                                                                                                                                                                    |                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                               |  |                       |                                                                                                                    |  |
| Root Cause                                                   |                                                | FAULT CATEGORY                                                                                                                                                                     |                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                               |  |                       |                                                                                                                    |  |
| Environment <input type="checkbox"/>                         | No Re-verification <input type="checkbox"/>    | Pressure/Forced <input type="checkbox"/>                                                                                                                                           | Temperature/Cure <input type="checkbox"/>                  | Power Loss/Surge <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Positioned Wrong <input type="checkbox"/>     |  |                       |                                                                                                                    |  |
| Design <input type="checkbox"/>                              | Operator <input type="checkbox"/>              | Bending <input type="checkbox"/>                                                                                                                                                   | Set-up <input type="checkbox"/>                            | Folio/Program <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Outside Dimensions <input type="checkbox"/>   |  |                       |                                                                                                                    |  |
| Doc/Data <input type="checkbox"/>                            | Offset/Setup <input type="checkbox"/>          | Centre Not Concentric <input type="checkbox"/>                                                                                                                                     | BOM/Route <input type="checkbox"/>                         | Grain <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Over/Under tolerance <input type="checkbox"/> |  |                       |                                                                                                                    |  |
| Equip/Tooling <input type="checkbox"/>                       | Supplier <input type="checkbox"/>              | Cracks <input type="checkbox"/>                                                                                                                                                    | Broken/Damage/Defect <input type="checkbox"/>              | Weld <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Part Incorrect <input type="checkbox"/>       |  |                       |                                                                                                                    |  |
| Handling/Pre <input type="checkbox"/>                        | Training <input type="checkbox"/>              | Crimp/Kink/Ripple/Wave <input type="checkbox"/>                                                                                                                                    | Inspection Incomplete/Unqualified <input type="checkbox"/> | Wrong Stock Pulled <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Part Lost/Missing <input type="checkbox"/>    |  |                       |                                                                                                                    |  |
| Material <input type="checkbox"/>                            | Use for Testing <input type="checkbox"/>       | Cuffs <input type="checkbox"/>                                                                                                                                                     | Contamination <input type="checkbox"/>                     | Out of Sequence <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Part Moved <input type="checkbox"/>           |  |                       |                                                                                                                    |  |
| Internal Transport <input type="checkbox"/>                  | Poor Information <input type="checkbox"/>      | Crushing <input type="checkbox"/>                                                                                                                                                  | Countersink <input type="checkbox"/>                       | Off-set <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Drawing <input type="checkbox"/>              |  |                       |                                                                                                                    |  |
| Tribal Knowledge <input type="checkbox"/>                    | Rushing <input type="checkbox"/>               | Heat Treat <input type="checkbox"/>                                                                                                                                                | Cut Too Short <input type="checkbox"/>                     | Mislabeled <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Finish <input type="checkbox"/>               |  |                       |                                                                                                                    |  |
| LOA <input type="checkbox"/>                                 | Product Improvement <input type="checkbox"/>   | Wave/Twist in Tube <input type="checkbox"/>                                                                                                                                        | Instructions Incomplete/Unclear <input type="checkbox"/>   | Fit/Function <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Misread <input type="checkbox"/>              |  |                       |                                                                                                                    |  |
| Substation <input type="checkbox"/>                          | Process Improvement <input type="checkbox"/>   | Marks/Chatter <input type="checkbox"/>                                                                                                                                             | Drill Holes <input type="checkbox"/>                       | Misaligned/off center <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Turning Sequence <input type="checkbox"/>     |  |                       |                                                                                                                    |  |
| Past Expiry Date <input type="checkbox"/>                    | Manufacturing Process <input type="checkbox"/> |                                                                                                                                                                                    |                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                               |  |                       |                                                                                                                    |  |
| Misidentified <input type="checkbox"/>                       | Past Due <input type="checkbox"/>              | OTHER : _____                                                                                                                                                                      |                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                               |  |                       |                                                                                                                    |  |

# Picklist Print

July 31, 2015 3:26:04 PM

Page 1

Work Order ID: 135166

**\*135166\***

Parent Item: D350-748-243TRN

**\*D350-748-243TRN\***

Parent Item Name: Crosstube Installation, High Aft

Start Date: 7/31/2015

Required Date: 8/14/2015

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev: PRELIM New Issue LL 12.05.08

| Component Item ID/<br>Item Name | Replacement<br>Item ID | Mfg/<br>Purch | Bin<br>Item | Primary<br>Location | Last<br>Location | Route<br>Seq ID | Unit of<br>Measure | Qty on<br>Hand | Qty per Kit | Total<br>Qty | Qty<br>Issued | Date<br>Issued | Status |
|---------------------------------|------------------------|---------------|-------------|---------------------|------------------|-----------------|--------------------|----------------|-------------|--------------|---------------|----------------|--------|
| D6021-125                       |                        | Manufactured  | No          |                     |                  |                 | Each               | 103.0000       |             | 1            |               |                |        |
| <b>*D6021-125*</b>              |                        |               |             |                     |                  |                 |                    |                | <b>**</b>   |              |               |                |        |
| Crosstube Material - 17-4Ph SS  |                        |               |             |                     |                  |                 |                    |                |             |              |               |                |        |

| Location      | Loc Qty | Loc Code |
|---------------|---------|----------|
| HALL          | 71      |          |
| 127271        | 35      |          |
| <u>127272</u> | 16      |          |
| 85076         | 20      |          |
| LG            | 32      |          |
| 127272        | 32      |          |

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ 1 mm 15/08/13

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

| Item | Qty<br>-243 | Part Number                     | Description                                    |
|------|-------------|---------------------------------|------------------------------------------------|
| 1    | X           | D350-748-243                    | CROSSTUBE ASSEMBLY (AS 350/355 HI AFT)         |
| 2    | 1           | D6021-125                       | CROSSTUBE                                      |
| 3    | 2           | D3502-1                         | SUPPORT                                        |
| 4    | 2           | D5123-7                         | CLAMP CUSHION                                  |
| 5    | 1           | AETC-1032                       | INSERT                                         |
| 6    | 2           | MS21920-20<br>OR MS21920-21/-22 | CLAMP<br>(PER DART SPEC. M-MS21920-20/-21/-22) |
| 7    | 1           | NAS1149C0363R                   | WASHER (OR AN960C10)                           |
| 8    | 1           | NAS1635-3-8                     | SCREW (OR MS51958-63)                          |
| 9    | A/R         | PROSEAL 890 B-2                 | SEALANT, AMS-S-8802 CLASS B-2                  |

#### GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6021-125  
FINISHED LENGTH AFTER TURNING = 124.70±0.06 (AFTER BENDING/TRIMMING = 122.70 REF)
- 2) FINISH: PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCE: PER DART QSI 018 UNLESS OTHERWISE NOTED.  
WALL THICKNESS ECCENTRICITY PER DART QSI 038 7.2  
MIN. ALLOWABLE WALL IS -0.020 FROM NOMINAL
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: DART PART NUMBER "D350-748-243" AND BATCH NUMBER ON INSIDE OF CUFF  
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 29.85 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.290 HOLE.
- 9) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.

#### TURNING

- 10) BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.

#### BENDING

- 11) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES PER SIDE. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D. ON TOP HALF OF BEND, AND 8% ON BOTTOM HALF OF BEND.
- 12) MAX AMPLITUDE OF RIPPING ALONG BENT PORTION OF THE TUBE IS 0.030 (ZN A1-3)
- 13) MAX TWIST: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.38 (ZN C1-3).

#### ASSEMBLY

- 14) TO INSTALL D3502-1 SUPPORT: ABRASE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.02" TO 0.05" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- 15) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.

135166

SA 20150807

RELEASED

2015 MAR 18

ECN 15-547

UNDER REVIEW

15/14/15  
LRF 15-541

|            |             |    |          |
|------------|-------------|----|----------|
| A          | NEW ISSUE   | CP | 15.01.21 |
| REV.       | DESCRIPTION | BY | DATE     |
| DESIGN     |             |    |          |
| DRAWN      |             |    |          |
| CHECKED    |             |    |          |
| MFG. APPR. |             |    |          |
| APPROVED   |             |    |          |
| DE APPR.   |             |    |          |
| DATE       | 15.01.21    |    |          |

|                                                                                                                                                                                                                                                                          |                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| DART AEROSPACE LTD<br>HAWKESBURY, ONTARIO, CANADA                                                                                                                                                                                                                        |                        |
| DRAWING NO.<br>D350-748-243                                                                                                                                                                                                                                              | REV. A<br>SHEET 1 OF 4 |
| TITLE<br>CROSSTUBE (AS 350/355 HI AFT)                                                                                                                                                                                                                                   | SCALE<br>NTS           |
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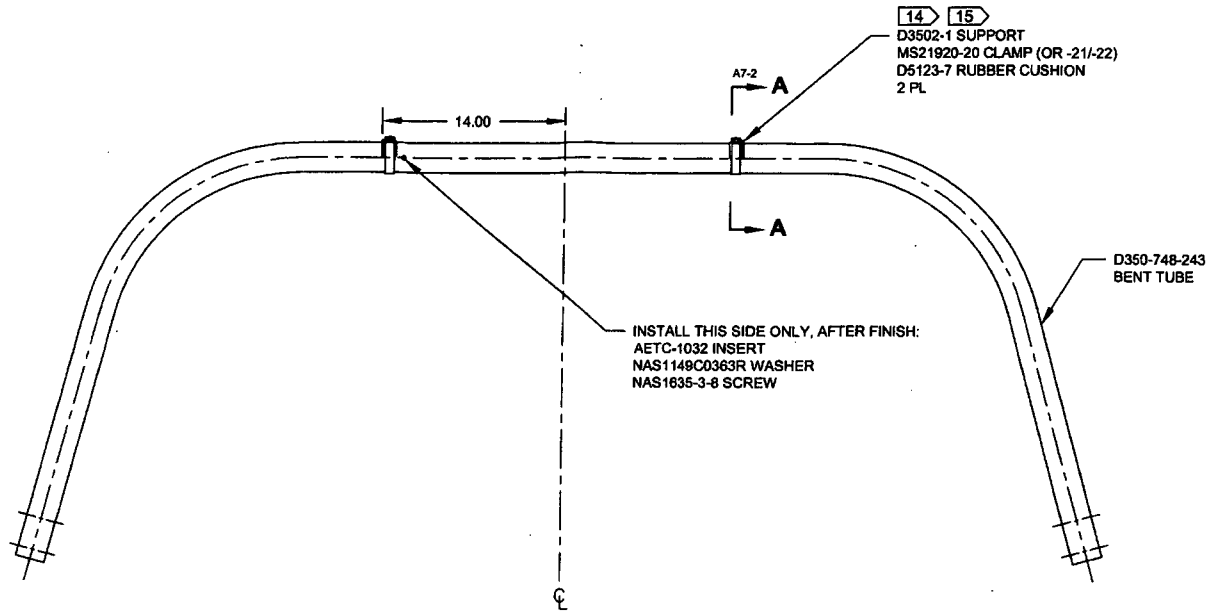
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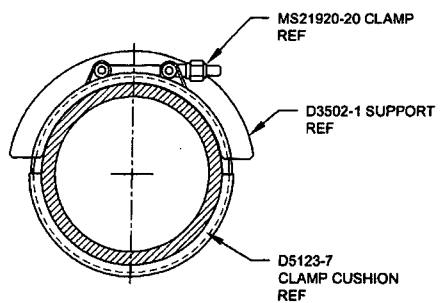
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**D350-748-243  
ASSEMBLY DETAIL**



**SECTION A-A D4-2  
SCALE 6X**

**UNDER REVIEW**

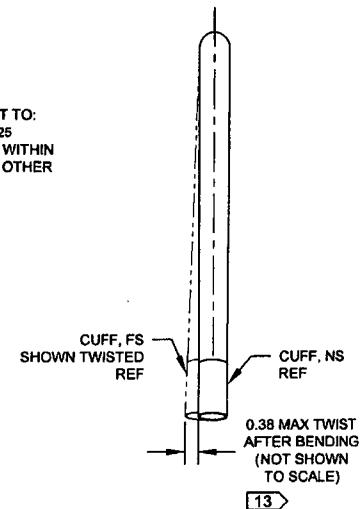
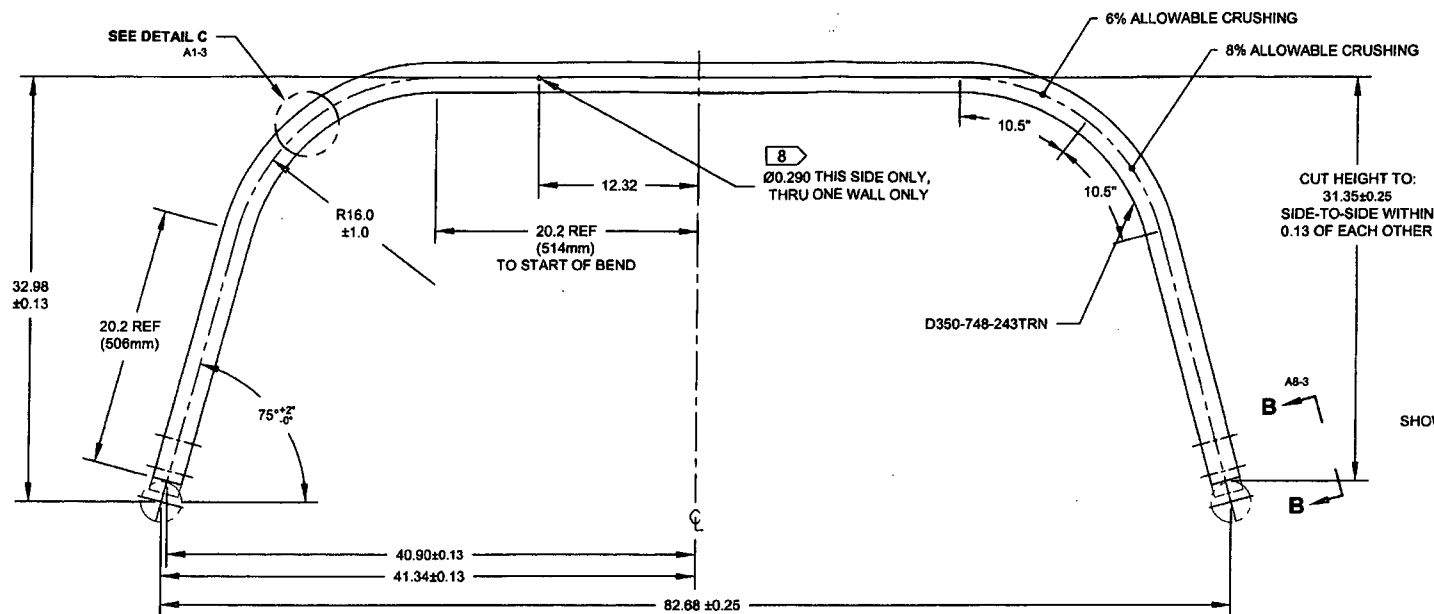
15/14/20

**RELEASED**

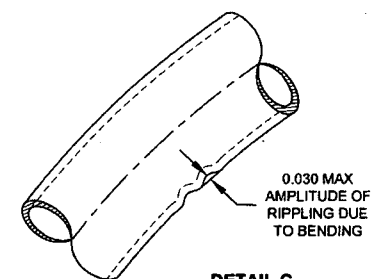
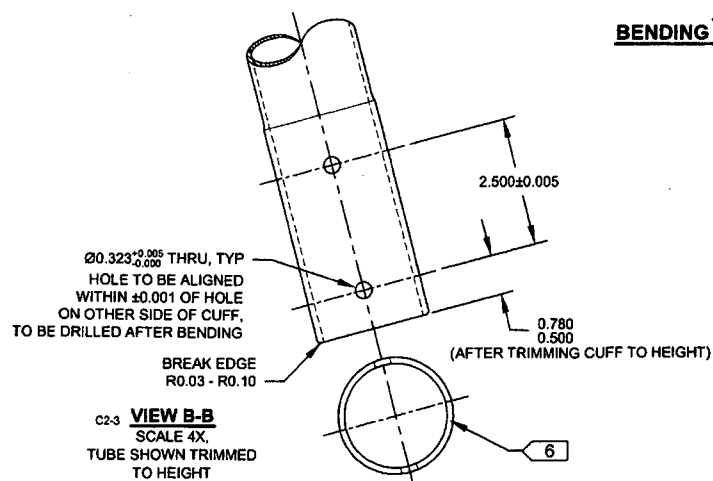
2015 MAR 18

|            |             |                                                                                                                                                                                                                                                                                |              |
|------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| DESIGN     | AP          | <b>DART AEROSPACE LTD</b><br>HAWKESBURY, ONTARIO, CANADA                                                                                                                                                                                                                       |              |
| DRAWN      | AP          |                                                                                                                                                                                                                                                                                |              |
| CHECKED    | A.P.        | DRAWING NO.                                                                                                                                                                                                                                                                    | REV. A       |
| MFG. APPR. | [Signature] | D350-748-243                                                                                                                                                                                                                                                                   | SHEET 2 OF 4 |
| APPROVED   | [Signature] | TITLE                                                                                                                                                                                                                                                                          | SCALE        |
| DE APPR.   | [Signature] | CROSSTUBE (AS 350/355 HI AFT)                                                                                                                                                                                                                                                  | NTS          |
| DATE       | 15.01.21    | COPYRIGHT © 2015 BY DART AEROSPACE LTD<br>THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS<br>NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT<br>WRITTEN PERMISSION FROM DART AEROSPACE LTD. |              |

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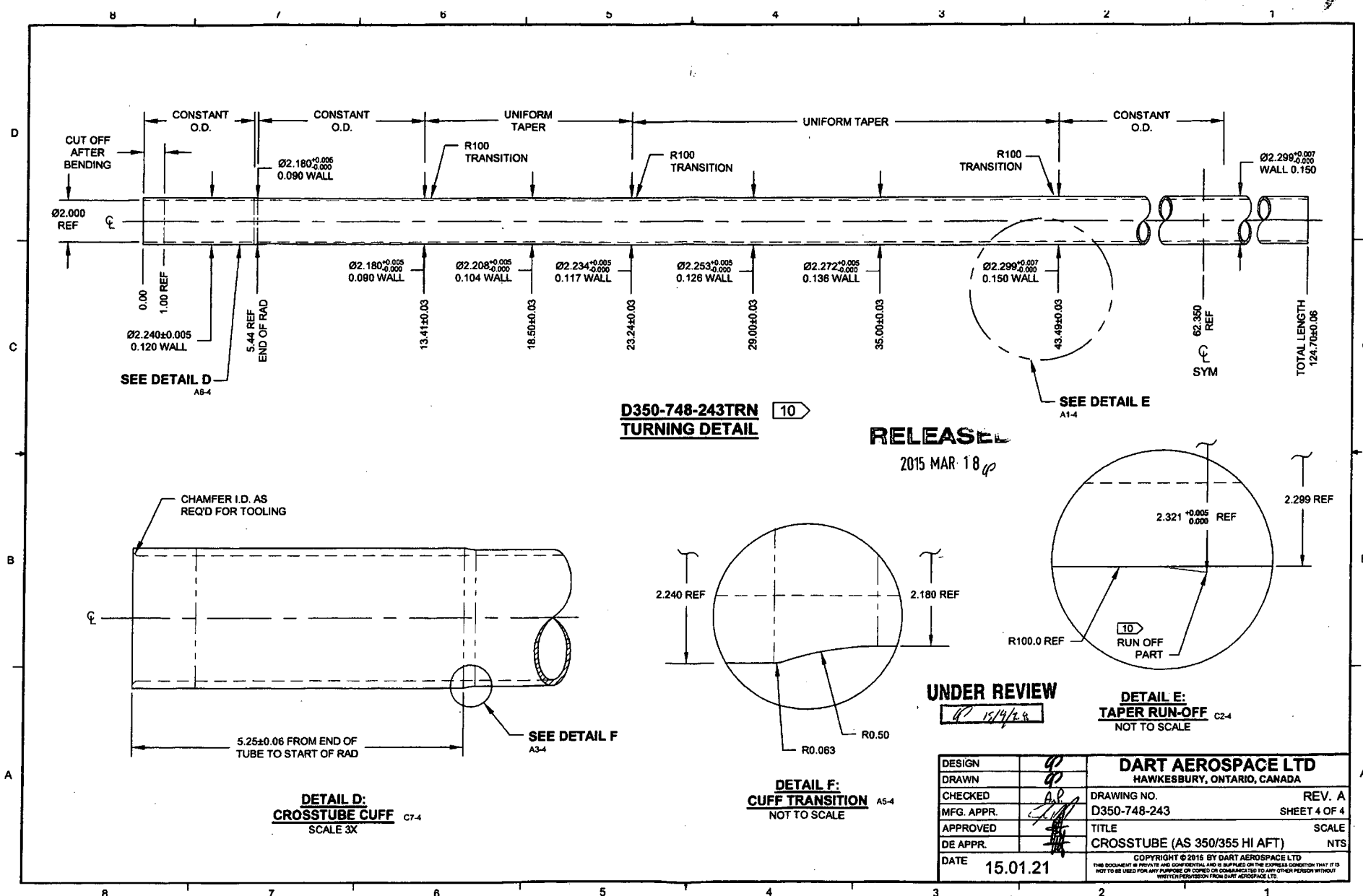
**D350-748-243**  
**BENDING AND DRILLING DETAIL** 11



**RELEASED**  
2015 MAR 18

**UNDER REVIEW**  
15.01.21

|            |          |                                                                                                                                                                                                                                                                                           |              |
|------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| DESIGN     | 90       | <b>DART AEROSPACE LTD</b>                                                                                                                                                                                                                                                                 |              |
| DRAWN      | 90       | HAWKESBURY, ONTARIO, CANADA                                                                                                                                                                                                                                                               |              |
| CHECKED    | A.P.     | DRAWING NO.                                                                                                                                                                                                                                                                               | REV. A       |
| MFG. APPR. |          | D350-748-243                                                                                                                                                                                                                                                                              | SHEET 3 OF 4 |
| APPROVED   |          | TITLE                                                                                                                                                                                                                                                                                     | SCALE        |
| DE APPR.   |          | CROSSTUBE (AS 350/355 HI AFT)                                                                                                                                                                                                                                                             | NTS          |
| DATE       | 15.01.21 | <small>COPYRIGHT © 2015 BY DART AEROSPACE LTD<br/>THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSES OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small> |              |



|                                                              |  |                     |              |
|--------------------------------------------------------------|--|---------------------|--------------|
| <b>DART AEROSPACE LTD</b>                                    |  | <b>Work Order:</b>  | 135166       |
| <b>Description:</b> Crosstube Assembly (AS350/355 High Aft)  |  | <b>Part Number:</b> | D350-748-241 |
| <b>Inspection Dwg:</b> D350-748-241 <b>Rev:</b> A <i>mmk</i> |  | <b>Page 1 of 2</b>  |              |

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mmk

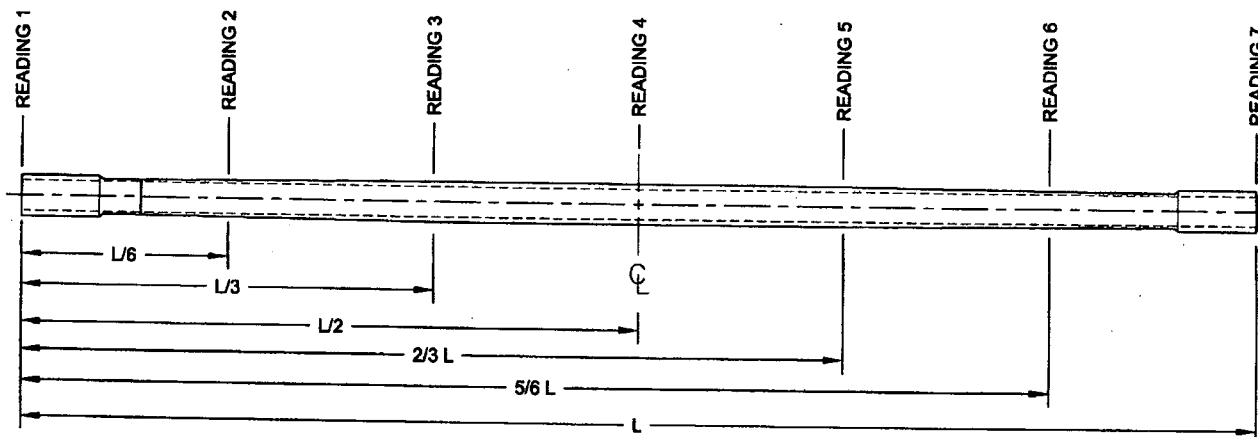
### FIRST ARTICLE INSPECTION CHECKLIST

| Inspection Sheet Drawing Dimension |        | Tolerance     | Actual Dimension | Accept | Reject | Method of Inspection | Comments |
|------------------------------------|--------|---------------|------------------|--------|--------|----------------------|----------|
| SIDE A                             | 2.240  | +0.005/-0.000 | 2.244            | ✓      |        | vern                 | CNC-08   |
|                                    | 2.180  | +0.005/-0.000 | 2.184            | ✓      |        | ↓                    |          |
|                                    | 2.180  | +0.005/-0.000 | 2.183            | ✓      |        |                      |          |
|                                    | 2.208  | +0.005/-0.000 | 2.212            | ✓      |        |                      |          |
|                                    | 2.234  | +0.005/-0.000 | 2.236            | ✓      |        |                      |          |
|                                    | 2.253  | +0.005/-0.000 | 2.254            | ✓      |        |                      |          |
|                                    | 2.272  | +0.005/-0.000 | 2.277            | ✓      |        |                      |          |
|                                    | 2.299  | +0.005/-0.000 | 2.304            | ✓      |        |                      |          |
|                                    | 0.063  | +/-0.010      | 0.063            | ✓      |        | vern                 | CNC-08   |
|                                    | 5.25   | +/-0.060      | 5.26             | ✓      |        | II                   |          |
|                                    | R0.063 | +/-0.010      | 0.063            | ✓      |        | RG                   |          |
|                                    | R0.50  | +/-0.030      | 0.500            | ✓      |        | II                   |          |
|                                    |        |               |                  |        |        |                      |          |
|                                    |        |               |                  |        |        |                      |          |
| SIDE B                             | 2.240  | +0.005/-0.000 | 2.245            | ✓      |        | vern                 | CNC-08   |
|                                    | 2.180  | +0.005/-0.000 | 2.184            | ✓      |        | ↓                    |          |
|                                    | 2.180  | +0.005/-0.000 | 2.183            | ✓      |        |                      |          |
|                                    | 2.208  | +0.005/-0.000 | 2.212            | ✓      |        |                      |          |
|                                    | 2.234  | +0.005/-0.000 | 2.237            | ✓      |        |                      |          |
|                                    | 2.253  | +0.005/-0.000 | 2.255            | ✓      |        |                      |          |
|                                    | 2.272  | +0.005/-0.000 | 2.277            | ✓      |        |                      |          |
|                                    | 2.299  | +0.005/-0.000 | 2.304            | ✓      |        |                      |          |
|                                    | 0.063  | +/-0.010      | 0.063            | ✓      |        | vern                 | CNC-08   |
|                                    | 5.25   | +/-0.060      | 5.26             | ✓      |        | II                   |          |
|                                    | R0.063 | +/-0.010      | 0.063            | ✓      |        | RG                   |          |
|                                    | R0.50  | +/-0.030      | 0.500            | ✓      |        | II                   |          |
|                                    |        |               |                  |        |        |                      |          |
|                                    |        |               |                  |        |        |                      |          |
|                                    | 124.70 | +/-0.060      | 124.70           | ✓      |        | type                 | LG-11    |

|                                                             |  |                                  |
|-------------------------------------------------------------|--|----------------------------------|
| <b>DART AEROSPACE LTD</b>                                   |  | <b>Work Order:</b> 135166        |
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| <b>Inspection Dwg:</b> D350-748-241 <b>Rev:</b> A mml       |  | <b>Page 2 of 2</b>               |

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mml

### WALL THICKNESS MEASUREMENT



| Location             | WALL THICKNESS MEASUREMENT (IN) |      |      |      | Deviation<br>$\Delta w$<br>(max-min) | TOLERANCE |
|----------------------|---------------------------------|------|------|------|--------------------------------------|-----------|
|                      | w1                              | w2   | w3   | w4   |                                      |           |
| READING 1<br>L = 0"  | .122                            | .130 | .140 | .136 | .018                                 | 0.030"    |
| READING 2<br>L = 21  | .097                            | .116 | .145 | .134 | .048                                 |           |
| READING 3<br>L = 42  | .149                            | .154 | .163 | .163 | .014                                 |           |
| READING 4<br>L = 62  | .159                            | .162 | .162 | .161 | .003                                 |           |
| READING 5<br>L = 83  | .167                            | .161 | .152 | .157 | .010                                 |           |
| READING 6<br>L = 104 | .135                            | .133 | .110 | .104 | .031                                 |           |
| READING 7<br>L = 124 | .130                            | .133 | .133 | .127 | .006                                 |           |

Dwg L  
0.111 0.014  
0.111 0.007

#### Calibration Result

DAS JAS  
47 17

Actual Block Thickness: 100.500

Sitescan 250 Measured Thickness: 100.50

|                         |
|-------------------------|
| <b>Measured by:</b> mml |
| <b>Date:</b> 15/08/19   |

|                            |
|----------------------------|
| <b>Audited by:</b> 9-89 39 |
| <b>Date:</b> 15-08-24      |

|                              |
|------------------------------|
| <b>Preliminary Approval:</b> |
| <b>Date:</b>                 |

| Rev | Date     | Change                             | Revised by | Approved |
|-----|----------|------------------------------------|------------|----------|
| B   | 12.02.02 | Dwg Rev updated (P/O D350-748-201) | KJ         |          |
| C   | 12.06.04 | Wall thickness form added          | KJ         |          |
| D   | 13.02.27 | Dimension 5.25 was 4.26            | KJ         |          |
| E   | 14.04.25 | 122.70 dimension revised to 124.70 | KJ         |          |
| F   | 15.04.14 | Dwg Rev updated                    | KJ         |          |